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EXAMINER	
ELMORE, REBA I	

ART UNIT	PAPER NUMBER
2189	

DATE MAILED: 06/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/747,921	CORRADO, FRANCIS R.	
	Examiner	Art Unit	
	Reba I. Elmore	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/24/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-39 are presented for examination.

DRAWINGS

2. The drawings are objected to because Figures 3 and 4 should be labeled 'Prior Art'. The description of these figures in paragraph 0009 state 'FIG. 3 illustrates one embodiment of a computing environment in which aspects are implemented' and 'an example of a storage controller which may be used in the computing environment of FIG. 3' but does not point out elements in the drawings, Figures 3 and 4 specifically, which are directed to the inventive concept of the present invention.

3. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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SPECIFICATION

4. The abstract is objected to as containing language not recommended for the content of an abstract. The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc. The following is suggested as a replacement for the first sentence of the abstract:

'A method, system and program manages updates of user data and parity data stored in stripes across a plurality of disk storage units arranged in a data organization type, such as a RAID array.'

Correction is required.

5. The disclosure is objected to because of the following informalities:

a) paragraph 0005, line 4, the space between 'stripe n' and the period needs to be deleted; and,

b) paragraph 00048, there is only a Figure 7 in the present application, not figures 7a-7b;

Appropriate correction is required.

6. The articles listed in the following paragraphs are required to be submitted in response to this office action.

paragraph 00014 -- "Serial ATA: High Speed Serialized AT Attachment" Rev. 1.0A (Jan. 2003);

paragraph 00015 -- "PCI Local Bus, Rev. 2.3", published by PCI-SIG;

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paragraph 00044 -- "Information Technology – Serial Attached SCSI (SAS)", reference no. ISO/IEC 14776-150:200x and ANSI INCITS.***:200xPHY layer (July 9, 2003), published by ANSI; and,

"Fibre Channel Framing and Signaling Interface", document no. ISO/IEC AWI 14165-25.

7. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

CLAIM OBJECTIONS

8. The following are objections to the claims:

a) the space before the period needs to be deleted for claims 4, 17 and 30; and,

b) the second period should be deleted at the end of claims 8, 21 and 34.

Correction is required.

35 USC § 101

9. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 14-26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. 'An article comprising a storage medium, the storage medium comprising machine readable instructions stored thereon to' would normally be considered statutory unless the specification defines the article as including intangible media. The

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specification, paragraph 00043, states the article of manufacture in which the code (instructions) is implemented may comprise a transmission media, such as a network transmission line, wireless transmission media, signals propagating through space, radio waves, infrared signals, etc. which are considered intangible media.

35 USC § 102(b)

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Dekoning et al. DeKoning teaches the invention (claim 1) as claimed including a method of writing data, comprising:

storing a first record in a disk storage unit wherein the first record includes an indication that a stripe of user data and parity data stored across a plurality of disk storage units potentially contains a parity inconsistency as storing data from the RAID disk drives to the cache where the data may be modified thereby changing both the data in the RAID stripe and possibly changing the parity of the data as well requiring the data to be written back from the cache to the RAID array and updating the parity (e.g., see col. 7, lines 12-51);

writing user data and parity data in the stripe indicated by the record as writing or posting the data block back to the correct stripe across the RAID disk array (e.g., see col. 7, lines 44-56); and,

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clearing the indication as indicating the dirty (modified) block is effectively 'cleaned' and is then marked as a normal block which is coherent with the data in the RAID disk array (e.g., see col. 7, lines 44-56).

As to claim 2, DeKoning teaches the first record contains a plurality of indications for a plurality of stripes across the plurality of disk storage units, that the plurality of stripes each potentially contains a parity inconsistency as being a cache memory which holds blocks of data from the RAID array with the cache memory holding a plurality of blocks which can belong to different stripes of the RAID array and with the blocks being in a dirty state (e.g., see col. 7, lines 18-56).

As to claim 3, DeKoning teaches the plurality of disk storage units are arranged in a Redundant Array of Independent Disks type (RAID) organization (e.g., see Figure 1, col. 5, lines 9-28 and Figure 2, lines 24-65).

As to claim 4, DeKoning teaches each indication includes an identification of the stripe being indicated and wherein each identification includes a RAID organization volume number and stripe number (e.g., see col. 6, lines 24-50).

As to claim 5, DeKoning teaches the invention further comprising:

receiving from a first plurality of write processes in a first accumulation period, a plurality of indications wherein each indication from a write process indicates that a destination stripe across the plurality of disk storage units, associated with the write process, potentially contains a parity inconsistency as there being stripe management data for each block in either the first level or second level cache with the accumulation period being the period of time for reading through the block identified as being in the stripe to be updated as this is a step process using a counter (e.g., see col. 9, line 46 to col. 10, line 21); and,

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storing in response to the plurality of indications from the first plurality of write processes, in a second record a plurality of indications wherein each indication of the second record indicates that a destination stripe of the first plurality of write processes potentially contains a parity inconsistency as the updating of the stripe management data structured (SMS) after the updating of the stripe (e.g., see col. 10, lines 23-37).

13. DeKoning teaches the invention (claim 14) as claimed including an article comprising a storage medium, the storage medium comprising machine readable instructions stored thereon to:

store a first record in a disk storage unit wherein the first record includes an indication that a stripe of user data and parity data stored across a plurality of disk storage units potentially contains a parity inconsistency as storing data from the RAID disk drives to the cache where the data may be modified thereby changing both the data in the RAID stripe and possibly changing the parity of the data as well requiring the data to be written back from the cache to the RAID array and updating the parity also (e.g., see col. 7, lines 12-51);

write user data and parity data in the stripe indicated by the record as writing or posting the data block back to the correct stripe across the RAID disk array (e.g., see col. 7, lines 44-56); and,

clear the indication as indicating the dirty (modified) block is effectively 'cleaned' and is then marked as a normal block which is coherent with the data in the RAID disk array (e.g., see col. 7, lines 44-56).

As to claim 15, DeKoning teaches the first record contains a plurality of indications for a plurality of stripes across the plurality of disk storage units, that the plurality of stripes each potentially contains a parity inconsistency as being a cache memory which holds blocks of data from the RAID array with the cache memory holding a plurality of blocks which can belong to

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different stripes of the RAID array and with the blocks being in a dirty state (e.g., see col. 7, lines 18-56).

As to claim 16, DeKoning teaches the plurality of disk storage units are arranged in a RAID type organization (e.g., see Figure 1, col. 5, lines 9-28 and Figure 2, lines 24-65).

As to claim 17, DeKoning teaches each indication includes an identification of the stripe being indicated and wherein each identification includes a RAID organization volume number and stripe number (e.g., see col. 6, lines 24-50).

As to claim 18, DeKoning teaches the invention further comprises machine readable instructions stored thereon to:

receive from a first plurality of write processes in a first accumulation period, a plurality of indications wherein each indication from a write process indicates that a destination stripe across the plurality of disk storage units, associated with the write process, potentially contains a parity inconsistency as there being stripe management data for each block in either the first level or second level cache with the accumulation period being the period of time for reading through the block identified as being in the stripe to be updated as this is a step process using a counter (e.g., see col. 9, line 46 to col. 10, line 21); and,

store in response to the plurality of indications form the first plurality of write processes, in a second record a plurality of indications wherein each indication of the second record indicates that a destination stripe of the first plurality of write processes potentially contains a parity inconsistency as the updating of the stripe management data structured (SMS) after the updating of the stripe (e.g., see col. 10, lines 23-37).

14. DeKoning teaches the invention (claim 27) as claimed including a system comprising:

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at least one memory which includes an operating system and an application as the host computer (e.g., see Figure 1);

a processor coupled to the memory (e.g., see Figure 1);

data storage having a plurality of disk storage units (e.g., see Figure 1);

a data storage controller for managing Input/Output (I/O) access to the data storage as the RAID controller (e.g., see Figure 1);

a device driver executable by the processor in the memory as being inherent as this is a necessary element for the proper functionality of the system, wherein at least one application, operating system and device driver is adapted to:

store a first record in a disk storage unit wherein the first record includes an indication that a stripe of user data and parity data stored across the plurality of disk storage units potentially contains a parity inconsistency as storing data from the RAID disk drives to the cache where the data may be modified thereby changing both the data in the RAID stripe and possibly changing the parity of the data as well requiring the data to be written back from the cache to the RAID array and updating the parity also (e.g., see col. 7, lines 12-51);

write user data and parity data in the stripe indicated by the record as writing or posting the data block back to the correct stripe across the RAID disk array (e.g., see col. 7, lines 44-56); and,

clear the indication as indicating the dirty (modified) block is effectively 'cleaned' and is then marked as a normal block which is coherent with the data in the RAID disk array (e.g., see col. 7, lines 44-56).

As to claim 28, DeKoning teaches the first record contains a plurality of indications for a plurality of stripes across the plurality of disk storage units, that the plurality of stripes each

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potentially contains a parity inconsistency as being a cache memory which holds blocks of data from the RAID array with the cache memory holding a plurality of blocks which can belong to different stripes of the RAID array and with the blocks being in a dirty state (e.g., see col. 7, lines 18-56).

As to claim 29, DeKoning teaches the plurality of disk storage units are arranged in a RAID type organization (e.g., see Figure 1, col. 5, lines 9-28 and Figure 2, lines 24-65).

As to claim 30, DeKoning teaches each indication includes an identification of the stripe being indicated and wherein each identification includes a RAID organization volume number and stripe number (e.g., see col. 6, lines 24-50).

As to claim 31, DeKoning teaches the application, operating system and device driver is further adapted to:

receive form a first plurality of write processes in a first accumulation period, a plurality of indications wherein each indication from a write process indicates that a destination stripe across the plurality of disk storage units, associated with the write process, potentially contains a parity inconsistency as there being stripe management data for each block in either the first level or second level cache with the accumulation period being the period of time for reading through the block identified as being in the stripe to be updated as this is a step process using a counter (e.g., see col. 9, line 46 to col. 10, line 21); and,

store in response to the plurality of indications form the first plurality of write processes, in a second record a plurality of indications wherein each indication of the second record indicates that a destination stripe of the first plurality of write processes potentially contains a parity inconsistency as the updating of the stripe management data structured (SMS) after the updating of the stripe (e.g., see col. 10, lines 23-37).

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35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claim rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning (5,778,426) in view of DeKoning et al. (6,073,218).

17. The independent claim 1 and intervening claim 5 are taught as given above using the primary reference.

As to claim 6, DeKoning teaches receiving a flush instruction from a first write process of the first plurality of write processes and in response to the flush instruction, writing the second record to a disk storage unit as the flush being a cache flush operation (e.g., see col. 17, lines 34-50 of 6,073,218). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaches of the second DeKoning reference with the teachings of the first Dekoning reference because there is common inventorship as well as the teaching of the second reference being a continuation of the subject matter of the first reference.

As to claim 7, DeKoning teaches sending, upon completion of the writing of the second record to a disk storage unit, a record write completion indication to each write process of the first plurality of write processes (e.g., see col. 10, lines 22-56 of 5,778,426).

As to claim 8, DeKoning teaches a second write process of the first plurality of write processes writes user data and parity data in the destination stripe associated with the second write process, in response to the second write process receiving a record write completion

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indication, and sends a mark clean instruction for the destination stripe associated with the second write process as the indication of reaching the count variable (e.g., see col. 9, line 46 to col. 10, line 21 of 5,778,426).

As to claim 9, DeKoning teaches receiving a mark clean instruction from the second write process of the first plurality of write processes and in response to the mark clean instruction, removing form the second record an indication that the destination stripe associated with the second write process potentially contains a parity inconsistency as the process or method of establishing the blocks within a selected stripe which are dirty and require updating with the RAID array, then doing the next selected stripe (e.g., see col. 9, line 46 to col. 10, line 21 of 5,778,426).

As to claim 10, DeKoning teaches the invention further comprising:

in response to the flush instruction, writing the second record to a flush record as the process of updating and posting the data back to the RAID array (e.g., see col. 17, lines 34-64 of 6,073,218);

receiving a second flush instruction form a third write process of the first plurality of write processes as the process of updating and posting the data back to the RAID array (e.g., see col. 17, lines 34-64 of 6,073,218); and,

determining if the second record containing an indication that a destination stripe associated with the third write process potentially contains a parity inconsistency, has already been written to a disk storage unit as the block data being inconsistent with the RAID array data thereby the parity being inconsistent also (e.g., see col. 7, lines 12-51 of 5,778,426).

As to claim 11, DeKoning teaches the invention further comprising:

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receiving from a second plurality of write processes after the flush instruction, a second plurality of indication wherein each indication from a write process indicates that a destination stripe across the plurality of disk storage units, associated with the write process, potentially contains a parity inconsistency as there being stripe management data for each block in either the first level or second level cache with the accumulation period being the period of time for reading through the block identified as being in the stripe to be updated as this is a step process using a counter (e.g., see col. 9, line 46 to col. 10, line 21 of 5,778,426); and,

storing in response to the plurality of indications from the second plurality of write processes, in the second record a second plurality of indications wherein each indication of the second plurality of indications of the second record indicates that a destination stripe of the second plurality of write processes potentially contains a parity inconsistency as the updating of the stripe management data structured (SMS) after the updating of the stripe (e.g., see col. 10, lines 23-37 of 5,778,426).

As to claim 12, DeKoning teaches receiving a third flush instruction from a first write process of the second plurality of write processes and in response to the third flush instruction, writing the second record to a disk storage unit, wherein the clearing the indication includes writing the second record to a disk storage unit in which the indication that the destination stripe associated with the second write process potentially contains a parity inconsistency has been removed (e.g., see col. 17, lines 34-50 of 6,073,218).

As to claim 13, DeKoning teaches the first record is stored with a first generation number in a first disk storage unit and the second record is stored with a second generation number in a disk storage unit different from the first disk storage unit (e.g., see col. 17, lines 34-50 of 6,073,218).

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18. The independent claim 14 and intervening claim 18 are taught as given above using the primary reference.

As to claim 19, DeKoning teaches the storage medium further comprises machine readable instructions stored thereon to receive a flush instruction from a first write process of the first plurality of write processes and in response to the flush instruction, write the second record to a disk storage unit as the flush being a cache flush operation (e.g., see col. 17, lines 34-50). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaches of the second DeKoning reference with the teachings of the first Dekoning reference because there is common inventorship as well as the teaching of the second reference being a continuation of the subject matter of the first reference.

As to claim 20, DeKoning teaches the storage medium further comprises machine readable instructions stored thereon to send, upon completion of the writing of the second record to a disk storage unit, a record write completion indication to each write process of the first plurality of write processes (e.g., see col. 10, lines 22-56 of 5,778,426).

As to claim 21, DeKoning teaches the storage medium further comprises machine readable instructions stored thereon for a second write process of the first plurality of write processes to write user data and parity data in the destination stripe associated with the second write process, in response to the second write process receiving a record write completion, and to send a mark clean instruction for the destination stripe associated with the second write process as the indication of reaching the count variable (e.g., see col. 9, line 46 to col. 10, line 21 of 5,778,426).

As to claim 22, DeKoning teaches the storage medium further comprises machine readable instructions stored thereon to receive a mark clean instruction form the second write

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process of the first plurality of write processes and in response to the mark clean instruction, remove form the second record an indication that the destination stripe associated with the second write process potentially contains a parity inconsistency

As to claim 23, DeKoning teaches the invention wherein the storage medium further comprises machine readable instructions stored thereon to:

in response to the flush instruction, write the second record to a flush record as the process of updating and posting the data back to the RAID array (e.g., see col. 17, lines 34-64 of 6,073,218);

receive a second flush instruction from a third write process of the first plurality of write processes as the process of updating and posting the data back to the RAID array (e.g., see col. 17, lines 34-64 of 6,073,218); and,

determine if the second record containing an indication that a destination stripe associated with the third write process potentially contains a parity inconsistency, has already been written to a disk storage unit as the block data being inconsistent with the RAID array data thereby the parity being inconsistent also (e.g., see col. 7, lines 12-51 of 5,778,426).

As to claim 24, DeKoning teaches the storage medium further comprises machine readable instructions stored thereon to:

receive from a second plurality of write processes after the flush instruction, a second plurality of indications wherein each indication form a write process indicates that a destination stripe across the plurality of disk storage units, associated with the write process, potentially contains a parity inconsistency as there being stripe management data for each block in either the first level or second level cache with the accumulation period being the period of time for

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reading through the block identified as being in the stripe to be updated as this is a step process using a counter (e.g., see col. 9, line 46 to col. 10, line 21); and,

store in response to the plurality of indications form the second plurality of write processes, in the second record a second plurality of indications wherein each indication in the second plurality of indications of the second record indicates that a destination stripe of the second plurality of write processes potentially contains a parity inconsistency as the updating of the stripe management data structured (SMS) after the updating of the stripe (e.g., see col. 10, lines 23-37 of 5,778,426).

As to claim 25, DeKoning teaches the storage medium further comprises machine readable instructions stored thereon to receive a third flush instruction from a first write process of the second plurality of write processes and in response to the third flush instruction, write the second record to a disk storage unit, wherein the clearing the indication includes writing the second record to a disk storage unit in which the indication that the destination stripe associated with the second write process potentially contains a parity inconsistency has been removed (e.g., see col. 17, lines 34-50 of 6,073,218).

As to claim 26, DeKoning teaches the first record is stored with a first generation number in a first disk storage unit and the second record is stored with a second generation number in a disk storage unit different from the first disk storage unit (e.g., see col. 17, lines 34-50 of 6,073,218).

19. The independent claim 27 and intervening claim 31 are taught as given above using the primary reference.

As to claim 32, DeKoning teaches the application, operating system and device driver is further adapted to receive a flush instruction from a first write process of the first plurality of

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write processes and in response to the flush instruction, write the second record to a disk storage unit as the flush being a cache flush operation (e.g., see col. 17, lines 34-50 of 6,073,218). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaches of the second DeKoning reference with the teachings of the first Dekoning reference because there is common inventorship as well as the teaching of the second reference being a continuation of the subject matter of the first reference.

As to claim 33, DeKoning teaches the application, operating system and device driver is further adapted to send, upon completion of the writing of the second record to a disk storage unit, a record write completion indication to each write process of the first plurality of write processes (e.g., see col. 10, lines 22-56 of 5,778,426).

As to claim 34, DeKoning teaches the application, operating system and device driver is further adapted for a second write process of the first plurality of write processes to write user data and parity data in the destination stripe associated with the second write process, in response to the second write process receiving a record write completion indication, and to send a mark clean instruction for the destination stripe associated with the second write process as the indication of reaching the count variable (e.g., see col. 9, line 46 to col. 10, line 21 of 5,778,426).

As to claim 35, DeKoning teaches the application, operating system and device driver is further adapted to receive a mark clean instruction from the second write process of the first plurality of write processes and in response to the mark clean instruction, remove from the second record an indication that the destination stripe associated with the second write process potentially contains a parity inconsistency

As to claim 36, DeKoning teaches the application, operating system and device driver is further adapted to:

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in response to the flush instruction, write the second record to a flush record as the process of updating and posting the data back to the RAID array (e.g., see col. 17, lines 34-64 of 6,073,218);

receive a second flush instruction from a third write process of the first plurality of write processes as the process of updating and posting the data back to the RAID array (e.g., see col. 17, lines 34-64 of 6,073,218); and,

determine if the second record containing an indication that a destination stripe associated with the third write process potentially contains a parity inconsistency, has already been written to a disk storage unit as the block data being inconsistent with the RAID array data thereby the parity being inconsistent also (e.g., see col. 7, lines 12-51 of 5,778,426).

As to claim 37, DeKoning teaches the application, operating system and device driver is further adapted to:

receive from a second plurality of write processes after the flush instruction, a second plurality of indications wherein each indication from a write process indicates that a destination stripe across the plurality of disk storage units, associated with the write process, potentially contains a parity inconsistency as there being stripe management data for each block in either the first level or second level cache with the accumulation period being the period of time for reading through the block identified as being in the stripe to be updated as this is a step process using a counter (e.g., see col. 9, line 46 to col. 10, line 21 of 5,778,426); and,

store in response to the plurality of indications from the second plurality of write processes, in the second record a second plurality of indications wherein each indication of the second plurality of indications of the second record indicates that a destination stripe of the second plurality of write processes potentially contains a parity inconsistency as the updating of

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the stripe management data structured (SMS) after the updating of the stripe (e.g., see col. 10, lines 23-37 of 5,778,426).

As to claim 38, DeKoning teaches the application, operating system and device drive is further adapted to receive a third flush instruction form a first write process of the second plurality of write processes and in response to the third flush instruction, write the second record to a disk storage unit, wherein the clearing the indication includes writing the second record to a disk storage unit in which the indication that the destination stripe associated with the second write process potentially contains a parity inconsistency has been removed (e.g., see col. 17, lines 34-50 of 6,073,218).

As to claim 39, DeKoning teaches the first record with a first generation number in a first disk storage unit and the second record is stored with a second generation number in a disk storage unit different form the first disk storage unit (e.g., see col. 17, lines 34-50 of 6,073,218).

CONCLUSION

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reba I. Elmore, whose telephone number is (571) 272-4192. The examiner can normally be reached on Tuesday and Thursday from 7:30am to 6:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the art unit supervisor for AU 2189, Reginald G. Bragdon, can be reached for general questions concerning this application at (571) 272-4204. Additionally, the official fax phone number for the art unit is (571) 273-8300.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center central telephone number is (571) 272-2100.

Reba I. Elmore
Primary Patent Examiner
Art Unit 2189

Tuesday, June 20, 2006

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